Evolutionary Systematics. 4 2020, 53–60 | DOI 10.3897/evolsyst.4.48407

EVOLUTIONARY SYSTEMATICS

An updated checklist of type material of dragonflies and damselflies (Odonata) housed in the Zoological Museum Hamburg (ZMH), Germany

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http://zoobank.org/C930532E-614C-43FD-AC46-C360B0DD8D73

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Academic editor: Danilo Harms ♦ **Received** 12 November 2019 ♦ **Accepted** 26 March 2020 ♦ **Published** 20 May 2020

Abstract

We present an updated checklist of type specimens of dragonflies (Odonata: Anisoptera) and damselflies (Odonata: Zygoptera) housed in the collection of the Zoological Museum of Hamburg (ZMH), part of the Centrum für Naturkunde (CeNak), Hamburg, Germany. We list all types currently housed in the dry and wet collections of the museum and compare the current holdings to the previous catalogues provided by Weidner (1962, 1977). In total, the collection of the ZMH currently houses 84 type specimens belonging to 44 species (38 of which are still valid species); these include 17 holotypes, 7 syntypes, 4 lectotypes, 33 paratypes, and 23 paralectotypes. We here provide an updated list of Odonata types in the ZMH, which includes any changes in taxonomy, but also corrects mistakes of previous catalogues.

Key Words

Centrum für Naturkunde, CeNak, Anisoptera, Zygoptera

Introduction

Type collections represent the most valuable material in museum collections as they are the ultimate reference for species (Bradley et al. 2014; Schindel and Cook 2018). However, the locations of many types remain unknown as museums often do not have the capacity to provide complete lists of their types, or even images of all specimens, despite enhanced efforts of digitization. Therefore, complete type catalogs are a valuable resource for the community.

The Centrum für Naturkunde (CeNak) was newly founded in 2014 and is the umbrella for the mineralogical, the geological-paleontological, and the zoological collections. The zoological collection, also known as the Zoological Museum of Hamburg (ZMH), has a long tradition and was originally established in 1843. Important collections, such as the ones from the Museum Goddefroy (1861–1885), a private museum based on collections assembled by Johann Cesar VI Godeffroy, were bought and implemented in the the ZMH. However, large parts of the collections, especially the dry material of the collection of holometabolous insects was destroyed during the second World War (WW2) in 1943. Fortunately, most of the collection of hemimetabolous insects could be saved; hence, this part of the Hamburg collection is specifically old, valuable and rich in type specimens.

Herbert Weidner was the curator of the entomological collections in Hamburg after WW2 (between 1950 and 1976) and rebuild much of the collections following their partial destruction. He was also the first to provide commented catalogues on the collections with a focus on the types housed in Hamburg; he published these catalogues of the entomological and arachnological collections in a series of papers between 1962 until 1977 in the journal Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut. Most of these contributions were pub-

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Figure 1. Examples of labels from **a)** Emond de Selys; **b)** Friedrich M. Brauer; **c)** Friedrich Ris and Karl F. Buchholz; **d)** Erich Schmidt, **e)** Martius A. Lieftinck; and **f)** Otto le Roi.

lished in German, restricting their accessibility for international scientists. Since Weidner, no further catalogues were published on the collections until recently, when catalogues on the solifigues (Harms and Dupere 2018), on the mayflies (Satori et al. 2016) and on the Caelifera and Ensifera have been published (Dey and Husemann 2018a, b). In this paper we provide an updated checklist of the types of dragonflies and damselflies currently housed in the collection of the ZMH based on the original catalogues of Odonata by Weider (1962, 1977). We further provide images of example labels of the most important taxonomists having worked with the collection.

Results and discussion

In his first catalogue in 1962, Weidner listed the types of 41 species of dragon- and damselflies; in his update from 1977 he reported the types of seven additional species, raising the total number of species of which types should be held in the collection to 48. The types of five of these 48 species were considerd lost by Weidner (1962, 1977): *Neurothemis nesaea* Ris, 1911, *Leptogomphus retroflexus* Ris, 1921, *Anax chrysomelas* Ris, 1911, *Nesobasis longistyla* Selys, 1891 and *N. nigrostigma* Selys, 1891. Hence, the types of 43 species and subspecies were present in 1977.

Currently, the collection of the ZMH houses the types of 44 species (38 of which are still valid). In total 84 type specimens are present in the collection; these include 17 holotypes, 7 syntypes, 4 lectotypes, 33 paratypes and 23 paralectotype (Table 1). Most of the species currently held in the collection were already documented in Weidner's catalogues. The types of *Neurothemis nesaea* Ris, 1911 and *Leptogomphus retroflexus* Ris, 1921 (now *Heliogomphus retroflexus*), which were listed as missing by Weidner (1962) were re-discovered. A specimen labelled as syntype of *Trithemis dichroa* (Karsch, 1893) is present in the collection (ZMH65941), but was suggested to be invalid by Weidner (1962). Based on the collection data, we agree with Weidner (1962), that this is not a syntype of the species as the type location, as well as the collection date of the original descriptions do not match. The type

Figure 2. Male holotype of *Nubiolestes diotima*; the original label states *Eolestes camerunensis*, but in the description the species is named *Eolestes diotima*. All label information match the original description.

Figure 3. Rediscovered paralectotype of *Neurothemis nesaea* assigned by Malte Seehausen in 2016.

Figure 4. Female syntype of *Macrothemis cynthia*.

Figure 5. Rediscovered female paratype of *Leptogomphus retroflexus* which was considered lost by Weidner (1962).

Table 1. List of type specimens currently housed in the collection of the ZMH. Collection numbers, current valid name and senior synonymies, type status, as well as important collection information are given. Current taxonomic assignment is based on Bridges (1994), Steinmann (1997a, 1997b) and Schorr and Paulson (2019); all specimens besides ZMH65834 are kept dry. † after the type = is lost.

ID	Family	Species Name	Syn of.	Sex	Type	Country	Region	Location	Previous catalogue
ZMH65877	Aeshnidae	*Gynacantha schultzei* Le Roi, 1915	*Gynacantha sextans* (McLachlan, 1896)	m	Holotype	Equatorial Guinea	Span. Guinea	Benito	Weidner 1962
ZMH65834	Aeshnidae	*Heliaeschna lanceolata* Le Roi, 1915	*Heliaeschna fuliginosa* Karsch, 1893[+]	m	Holotype	Dem. Rep. Congo		Ubangi-District, Duma	Weidner 1962
ZMH65876	Aeshnidae	*Plattycantha acuta* Lieftinck, 1937		m	Paratype	Indonesia	North New Guinea	Hollandia, Humboldt-Baai, Cycloop Mountains, 1000m	Weidner 1962
ZMH65841	Chlorocyphidae	*Chlorocypha aphrodite* (Le Roi, 1915)		m	Holotype	Dem. Rep. Congo		Dolo	Weidner 1962
ZMH65840	Coenagrionidae	*Acanthagrion peruanum* Schmidt, 1942		m	Holotype	Peru	South-Peru	Sivia 520m, Shore of Apurimac	Weidner 1962
ZMH65829	Coenagrionidae	*Agriocnemis gratiosa* Gerstäcker 1891		m	Syntype	Tansania	Sansibar	Nasimoya	Weidner 1962
ZMH65830	Coenagrionidae	*Agriocnemis gratiosa* Gerstäcker 1891		f	Syntype	Tansania	Sansibar		Weidner 1962
ZMH65832	Coenagrionidae	*Ceriagrion aeruginosum* (Brauer, 1869)		f	Holotype	Australia		Rockhampton	Weidner 1962
ZMH65937	Coenagrionidae	*Agrion distigma* Brauer, 1869	*Ischnura heterostictum* (Burmeister, 1839)	m	Lectotype[1]				Weidner 1962
ZMH65837	Coenagrionidae	*Melanesobasis flavilabris* (Selys, 1891)		f	Paratype	Rep. Fidschi	Fidschi	Viti	Weidner 1977
ZMH65838	Coenagrionidae	*Melanesobasis flavilabris* (Selys, 1891)		m	Paratype	Rep. Fidschi	Fidschi	Viti	Weidner 1977
ZMH65833	Coenagrionidae	*Melanesobasis annulata* (Brauer, 1869)		m	Holotype	Polynesia	Samoa		Weidner 1962
ZMH65835	Coenagrionidae	*Nesobasis erythrops* Selys, 1891		m	Paralectotype	Rep. Fidschi	Fidschi	Viti	Weidner 1977
ZMH65836	Coenagrionidae	*Nesobasis erythrops* Selys, 1891		m	Paralectotype	Rep. Fidschi	Fidschi	Viti	Weidner 1977
ZMH65839	Coenagrionidae	*Nesobasis telegastrum* Selys, 1891		m	Holotype	Rep. Fidschi	Fidschi	Viti	Weidner 1977
	Coenagrionidae	*Nesobasis longistyla* Selys, 1891		m	Holotype †	Rep. Fidschi	Fidschi	Viti	Wediner 1962
	Coenagrionidae	*Nesobasis nigrostigma* Selys, 1891		m	Holotype †	Rep. Fidschi	Fidschi	Viti	Wediner 1962
ZMH65827	Coenagrionidae	*Palaiargia perimecosoma* Lieftinck, 1957		2f	Paratype	Indonesia	Halmahera	Mumar-River, 200-300m	Weidner 1962
ZMH65828	Coenagrionidae	*Palaiargia perimecosoma* Lieftinck, 1957		m	Paratype	Indonesia	Halmahera	Mumar-River, 200-300m	Weidner 1962
ZMH65831	Coenagrionidae	*Pseudagrion cingillum* (Brauer 1869)		m	Lectotype[1]	Australia		Rockhampton	Weidner 1962
ZMH65842	Gomphidae	*Archaeogomphus* (*Austroarchaeogomphus*) *infans* (Ris, 1913)		f	Holotype	Brasil		Espirito Santo	Weidner 1962
ZMH65853	Gomphidae	*Gomphidia caesarea* Lieftinck, 1929		m	Holotype	Indonesia	Borneo	Lebang Hara	Weidner 1962
ZMH65854	Gomphidae	*Heliogomphus blandulus* Lieftinck, 1929		m	Holotype	Indonesia	Borneo	Swamp forest at Bika River	Weidner 1962
ZMH65942	Gomphidae	*Heliogomphus retroflexus* (Ris, 1912)		f	Paratype	Vietnam	Tonkin	Than Moi	Weidner 1962*
ZMH65943	Gomphidae	*Heliogomphus retroflexus* (Ris, 1912)		f	Paratype	Vietnam	Tonkin	Than Moi	Weidner 1962*
ZMH65944	Gomphidae	*Heliogomphus retroflexus* (Ris, 191a)		f	Paratype	Vietnam	Tonkin	Than Moi	Weidner 1962*
ZMH65945	Gomphidae	*Heliogomphus retroflexus* (Ris, 1912)		f	Paratype	Vietnam	Tonkin	Than Moi	Weidner 1962*
ZMH65843	Gomphidae	*Phyllocycla titschacki* (Schmidt, 1942)		m	Holotype	Peru	South-Peru	Sivia 520m	Weidner 1962
ZMH65846	Gomphidae	*Progomphus adaptatus* Belle, 1973		m	Holotype	Brasil		Espirito Santo	Weidner 1977
ZMH65847	Gomphidae	*Progomphus adaptatus* Belle, 1973		f	Paratype	Brasil		Espirito Santo	Weidner 1977
ZMH65848	Gomphidae	*Progomphus adaptatus* Belle, 1973		f	Paratype	Brasil		Espirito Santo	Weidner 1977
ZMH65849	Gomphidae	*Progomphus adaptatus* Belle, 1973		f	Paratype	Brasil		Espirito Santo	Weidner 1977
ZMH65850	Gomphidae	*Progomphus adaptatus* Belle, 1973		f	Paratype	Brasil		Espirito Santo	Weidner 1977
ZMH65844	Gomphidae	*Progomphus guyanensis* Belle, 1966		f	Paratype	Surinam		Dauwdropkam	Weidner 1977
ZMH65845	Gomphidae	*Progomphus guyanensis* Belle, 1966		m	Paratype	Surinam		Dauwdropkam	Weidner 1977
ZMH65851	Gomphidae	*Progomphus recurvatus* Ris, 1911		m	Holotype	Brasil		Espirito Santo	Weidner 1962
ZMH65852	Gomphidae	*Progomphus recurvatus* Ris, 1911		f	Paratype	Brasil		Espirito Santo	Weidner 1962
ZMH65887	Libellulidae	*Diplacina persephone* Lieftinck, 1933		m	Paralectotype	Indonesia	North New Guinea	Hollandia	Weidner 1962
ZMH65888	Libellulidae	*Diplacina persephone* Lieftinck, 1933		m	Paralectotype	Indonesia	North New Guinea	Hollandia	Weidner 1962

ID	Family	Species Name	Syn of.	Sex	Type	Country	Region	Location	Previous catalogue
ZMH65889	Libellulidae	*Erythrodiplax ines* Ris, 1909		m	Syntype	Ecuador		Santa Inéz, east of the Andes, 1250m	Weidner 1962
ZMH65890	Libellulidae	*Erythrodiplax ines* Ris, 1909		f	Syntype	Ecuador		Santa Inéz, east of the Andes, 1250m	Weidner 1962
ZMH65894	Libellulidae	*Huonia oreophila* Lieftnick, 1935		f, m	Paratype	Indonesia	North New Guinea	Hollandia, Humboldt-Baai, Cycloop Mountains, 1000m	Weidner 1962
ZMH65895	Libellulidae	*Huonia thais* Lieftinck, 1953		3m	Paratype	Indonesia		Misool Island (W.), 0–75m	Weidner 1962
ZMH65932	Libellulidae	*Macrothemis cynthia* Ris, 1913		f	Syntype	Brasil		Espirito Santo	Weidner 1962
ZMH65885	Libellulidae	*Micromacromia camerunica* Karsch, 1890		f	Paratype	Cameroon		Hinterland Jaunde-Station	Weidner 1962
ZMH65884	Libellulidae	*Micromacromia zygoptera* (Ris, 1909)		m	Paratype	Cameroon		Mukonje-Farm, close to Mundame at Mungo River	Weidner 1962
ZMH65883	Libellulidae	*Microtrigonia gomphoides* Lieftinck, 1934		m	Paralectotype	Indonesia	North New Guinea	Hollandia	Weidner 1962
ZMH65939	Libellulidae	*Nannodiplax rubra* (Brauer, 1868)		m	Syntype	Australia	Queensland		Weidner 1962
ZMH65940	Libellulidae	*Nannodiplax rubra* (Brauer, 1868)		m	Syntype	Australia	Queensland		Weidner 1962
ZMH65882	Libellulidae	*Nannophlebia amphicyllis* Lieftinck, 1933		f, m	Paralectotype	Indonesia	North New Guinea	Hollandia, Humboldt-Baai, Cycloop Mountains, 1000m	Weidner 1962
ZMH65886	Libellulidae	*Neodythemis afra* (Ris, 1909)		m	Paratype	Cameroon		Mukonje-Farm, close to Mundame at Mungo River	Weidner 1962
ZMH65891	Libellulidae	*Neurothemis nesaea* Ris, 1911		f	Paralectotype[2]	Indonesia	South Sulawesi	Lompa-Battau	Weidner 1962*
ZMH65896	Libellulidae	*Orthetrum kraepelini* Ris, 1897	*Orthetrum cancellatum* (L., 1758)	m	Holotype	China		Maralbaschi at Kaschgar Darja	Weidner 1962
ZMH65897	Libellulidae	*Orthetrum kraepelini* Ris, 1897	*Orthetrum cancellatum* (L. , 1758)	f	Paratype	China		Maralbaschi at Kaschgar Darja	Weidner 1962
ZMH65898	Libellulidae	*Orthetrum kraepelini* Ris, 1897	*Orthetrum cancellatum* (L. , 1758)	f	Paratype	China		Maralbaschi at Kaschgar Darja	Weidner 1962
ZMH65899	Libellulidae	*Orthetrum kraepelini* Ris, 1897	*Orthetrum cancellatum* (L. , 1758)	f	Paratype	China		Maralbaschi at Kaschgar Darja	Weidner 1962
ZMH65900	Libellulidae	*Orthetrum kraepelini* Ris, 1897	*Orthetrum cancellatum* (L. , 1758)	f	Paratype	China		Maralbaschi at Kaschgar Darja	Weidner 1962
ZMH65938	Libellulidae	*Rhodopygia chloris* (Ris, 1911)	*Rhodopygia hollandi* (Calvert, 1907)	f	Paratype	Surinam	Upper Pará		Weidner 1962
ZMH65934	Libellulidae	*Rhyothemis phyllis dispar* Brauer 1867	*Rhyothemis phyllis* (Sulzer, 1776)	f	Paralectotype	Rep. Fidschi	Fidschi	Vanua and Balavu	Weidner 1962
ZMH65935	Libellulidae	*Rhyothemis phyllis dispar* Brauer 1867	*Rhyothemis phyllis* (Sulzer, 1776)	f	Paralectotype	Rep. Fidschi	Fidschi	Vanua and Balavu	Weidner 1962
ZMH65936	Libellulidae	*Rhyothemis phyllis dispar* Brauer 1867	*Rhyothemis phyllis* (Sulzer, 1776)	f	Paralectotype	Rep. Fidschi	Fidschi	Vanua and Balavu	Weidner 1962
ZMH65933	Libellulidae	*Rhyothemis regia chalcoptilon* (Brauer, 1867)	*Rhyothemis regia* (Brauer, 1867)	f	Holotype	Polynesia	Samoa		Weidner 1962
ZMH65892	Libellulidae	*Sympetrum tibialis* (Ris, 1897)		m	Holotype	China		Maralbaschi at Kaschgar Darja	Weidner 1962
ZMH65893	Libellulidae	*Sympetrum tibialis* (Ris, 1897)		m	Paratype	China		Maralbaschi at Kaschgar Darja	Weidner 1962
ZMH65901	Libellulidae	*Libellula stuhlmanni* Gerstäcker, 1891	*Trithemis arteriosa* (Gerstäcker 1891)	m	Lectotype[3]	Tansania	Sansibar		Weidner 1962
ZMH65902	Libellulidae	*Libellula stuhlmanni* Gerstäcker, 1891	*Trithemis arteriosa* (Gerstäcker 1891)	m	Paralectotype		East-Afrika		Weidner 1962
ZMH65903	Libellulidae	*Libellula stuhlmanni* Gerstäcker, 1891	*Trithemis arteriosa* (Gerstäcker 1891)	m	Paralectotype	Tansania	Sansibar	River Mucro (Mucra)	Weidner 1962
ZMH65904	Libellulidae	*Libellula stuhlmanni* Gerstäcker, 1891	*Trithemis arteriosa* (Gerstäcker 1891)	m	Paralectotype	Tansania		Mbusini (Usegua)	Weidner 1962
ZMH65926	Libellulidae	*Libellula stuhlmanni* Gerstäcker, 1891	*Trithemis arteriosa* (Gerstäcker 1891)	m	Paralectotype				Weidner 1962

ID	Family	Species Name	Syn of.	Sex	Type	Country	Region	Location	Previous catalogue
ZMH65927	Libellulidae	*Libellula stuhlmanni* Gerstäcker, 1891	*Trithemis arteriosa* (Gerstäcker 1891)	m	Paralectotype	Tansania	Sansibar	River Muera	Weidner 1962
ZMH65928	Libellulidae	*Libellula stuhlmanni* Gerstäcker, 1891	*Trithemis arteriosa* (Gerstäcker 1891)	m	Paralectotype	Tansania	Sansibar		Weidner 1962
ZMH65929	Libellulidae	*Libellula stuhlmanni* Gerstäcker, 1891	*Trithemis arteriosa* (Gerstäcker 1891)	f	Paralectotype	Tansania		Mbusini (Usegua)	Weidner 1962
ZMH65930	Libellulidae	*Libellula stuhlmanni* Gerstäcker, 1891	*Trithemis arteriosa* (Gerstäcker 1891)	f	Paralectotype	Tansania	Sansibar		Weidner 1962
ZMH65931	Libellulidae	*Libellula ardens* Gerstäcker, 1891	*Trithemis kirbyi* Selys, 1891	m	Lectotype[4]		East-Afrika		Weidner 1962
	Libellulidae	*Tramea samoensis* Brauer, 1866	*Tramea transmarina* Brauer, 1867	m	Holotype †	Samoa			Weidner 1962
	Libelluidae	*Tramea transmarina* Brauer, 1867		m	Syntype †	Rep. Fidschi	Fidschi	Viti	Wediner 1962
ZMH65826	Synlestidae	*Nubiolestes diotima* (Schmidt, 1943)		M	Holotype	Cameroon	„Esosung“	Bakossi-Mountains,	Weidner 1962
ZMH65878	Synthemistidae	*Synthemis feronia* (Lieftinck, 1938)		f, m	Paratype	Indonesia	North New Guinea	Hollandia, Humboldt-Baai	Weidner 1962
ZMH65879	Synthemistidae	*Palaeosynthemis gracilenta* (Lieftinck, 1935)		f, m	Paralectotype	Indonesia	North New Guinea	Hollandia, Humboldt-Baai, Cycloop Mountains, 1000m	Weidner 1962
ZMH65880	Synthemistidae	*Palaeosynthemis gracilenta* (Lieftinck, 1935)		f	Paralectotype	Indonesia	North New Guinea	Hollandia, Humboldt-Baai, Cycloop Mountains, 1000m	Weidner 1962
ZMH65881	Synthemistidae	*Palaeosynthemis gracilenta* (Lieftinck, 1935)		m	Paralectotype	Indonesia	North New Guinea	Hollandia, Humboldt-Baai, Cycloop Mountains, 1000m	Weidner 1962

[+]Synonymy established in Dijkstra (2005)
[1]Lectotype assigned by M. A. Lieftinck (1959)
[2]Paralectotype assigned by M. Seehausen (2016)
[3]Lectotype assigned by K. F. Buchholz (1959)
[4]Lectotype assigned by K. F. Buchholz (1959)
*stated as missing

of *Anax chrysomelas* Ris, 1911 listed in Weidner (1962) and *Nesobasis longistyla* Selys, 1891 and *N. nigrostigma* Selys, 1891 in Weidner (1977) as missing could not be found; however, Bridges (1994) lists the types of the *Nesobasis* species for the Institut Royal des Sciences Naturelles de Belgique (IRSN); hence, they may not be lost but in a different location. Weidner (1962) listed the type of *Anax chrysomelas* Ris, 1911 as lost. However, this species cannot be found in any other catalogue than that of Weidner (1962) and hence its species status is doubtful. Further, the types of *Tramea samoensis* Brauer, 1867, and *T. transmarina* Brauer, 1867, which were reported by Weidner (1962) were not found and hence have to be considered lost.

The types held in the ZMH collection have specific value, as many originate from tropical regions, which are difficult to access or where habitats of the species no longer exist. The majority of species the ZMH holds types of were described by Martius A. Lieftinck, Friedrich Ris, Emond de Selys, and Friedrich M. Brauer, important taxonomists of Odonata (see Fig. 1 for typical labels). Many of the species described by the above mentioned authors were based on material from the collections of the private Museum Goddefroy. Karl F. Buchholz investigated additional material from this collection housed in the ZMH and re-discovered and re-described some type material (Buchholz 1959). It remains possible that additional types are housed in the collection, which are not labelled as such. Detailed digitization and the work of specialists in the collection in the future will help to unlock its potential.

Acknowledgements

We are grateful to Thure Dalsgaard for images of the labels and some specimens. We thank Kai Schütte and Martin Kubiak for comments on an initial draft. We are further grateful to Vincent Kalkman, Gleison Desidéro, Angelo Pinto and Danilo Harms for valuable comments on a previous version of the manuscript.

References

Bradley RD, Bradley LC, Garner HJ, Baker RJ (2014) Assessing the value of natural history collections and addressing issues regarding long-term growth and care. BioScience 64: 1150–1158. https://doi.org/10.1093/biosci/biu166

Bridges CA (1994) Catalogue of family-group, genus-group and species-group names of the Odonata of the world (third edition). Urbana, Illinois. https://doi.org/10.5962/bhl.title.15291

Buchholz KF (1959) Odonaten aus dem Ennedigebirge, nebst Bemerkungen über einige äthiopische Arten. Bonner Zoologische Beiträge 10: 75–98.

Dey LS, Husemann M (2018a) An annotated catalogue of the types of bush-crickets and crickets (Orthoptera, Ensifera) housed in the Zoological Museum Hamburg (ZMH). Evolutionary Systematics 2: 115–124. https://doi.org/10.3897/evolsyst.2.27030

Dey LS, Husemann M (2018b) An annotated catalogue of the types of short-horned grasshoppers (Orthoptera, Caelifera) housed in the Zoological Museum Hamburg (ZMH). Evolutionary Systematics 2: 21–30. https://doi.org/10.3897/evolsyst.2.22127

Dijkstra K-DB (2005) Taxonomy and identification of the continental African Gynacantha and Heliaeschna species (Odonata: Aeshnidae). International Journal of Odonatology 8: 1–168. https://doi.org/10.1080/13887890.2005.9748240

Harms D, Dupérré N (2018) An annotated type catalogue of the camel spiders (Arachnida: Solifugae) held in the Zoological Museum Hamburg. Zootaxa 4375: 1–58. https://doi.org/10.11646/zootaxa.4375.1.1

Satori M, Kubiak M, Rajaei H (2016) An updated list of type material of Ephemeroptera Hyatt & Arms, 1890, deposited at the Zoological Museum of Hamburg (ZMH). Zookeys 607: 49–68. https://doi.org/10.3897/zookeys.607.9391

Schindel DE, Cook JA (2018) The next generation of natural history collections. PLoS Biology 16: e2006125. https://doi.org/10.1371/journal.pbio.2006125

Schorr M, Paulson D (2019) World list of Odonata. Last revision 2. Oct. 2019

Steinmann H (1997a) World catalogue of Odonata. Volume I Zygoptera. De Gruyter, Berlin, New York. https://doi.org/10.1515/9783110824438

Steinmann H (1997b) World catalogue of Odonata. Volume II Anisoptera. De Gruyter, Berlin, New York. https://doi.org/10.1515/9783110824438

Weidner H (1962) Die Entomologischen Sammlungen des Zoologischen Instituts und Zoologischen Museums der Universität Hamburg, Insecta I. Die Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut 60: 81–109.

Weidner H (1977) Die Entomologischen Sammlungen des Zoologischen Instituts und Zoologischen Museums der Universität Hamburg, XIV. (letzter Teil), Insecta XI. Die Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut 74: 77–138.